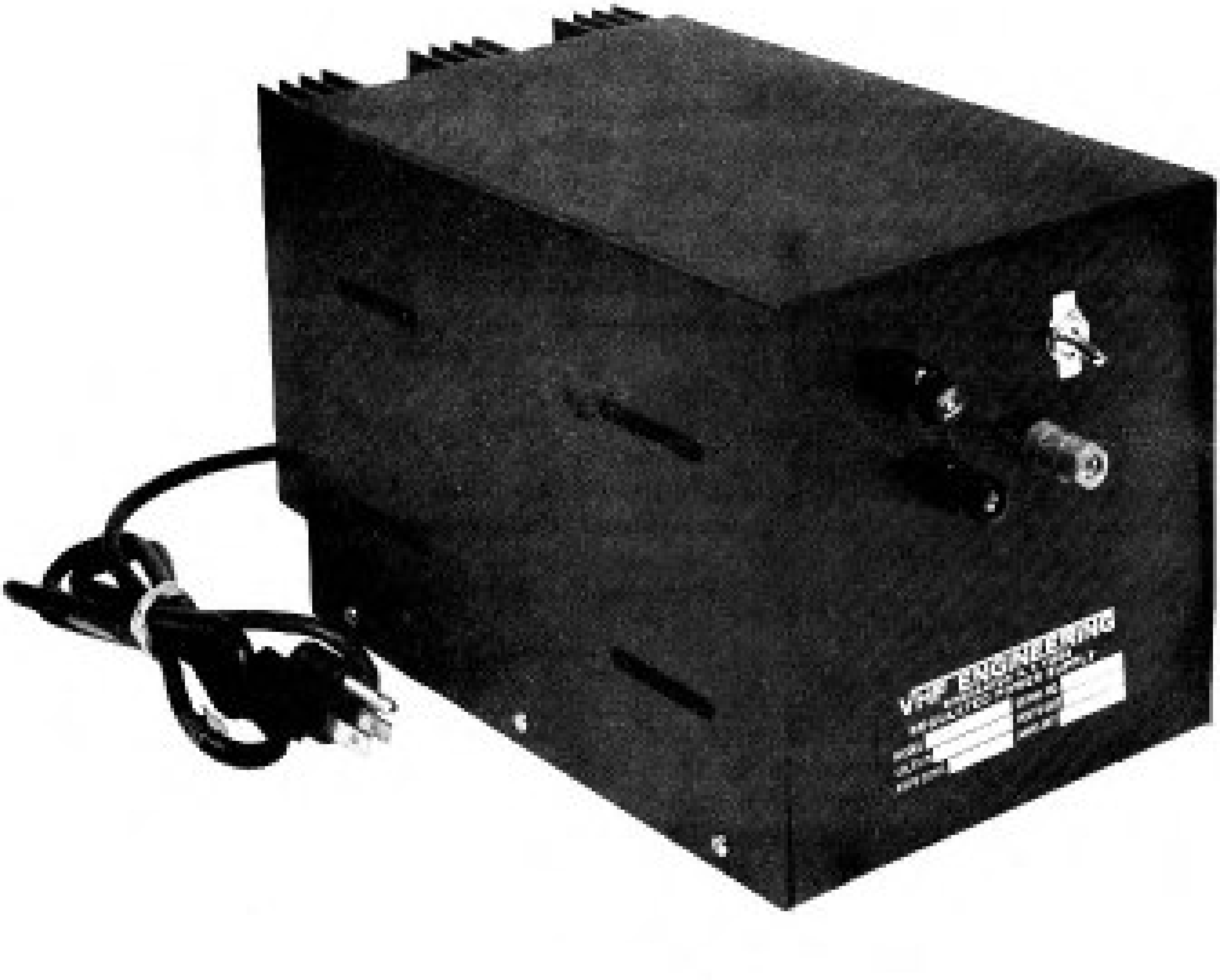
PS-25C
POWER SUPPLY KIT
#300
INSTRUCTION MANUAL



PRICE—$2.00

Vhf engineering
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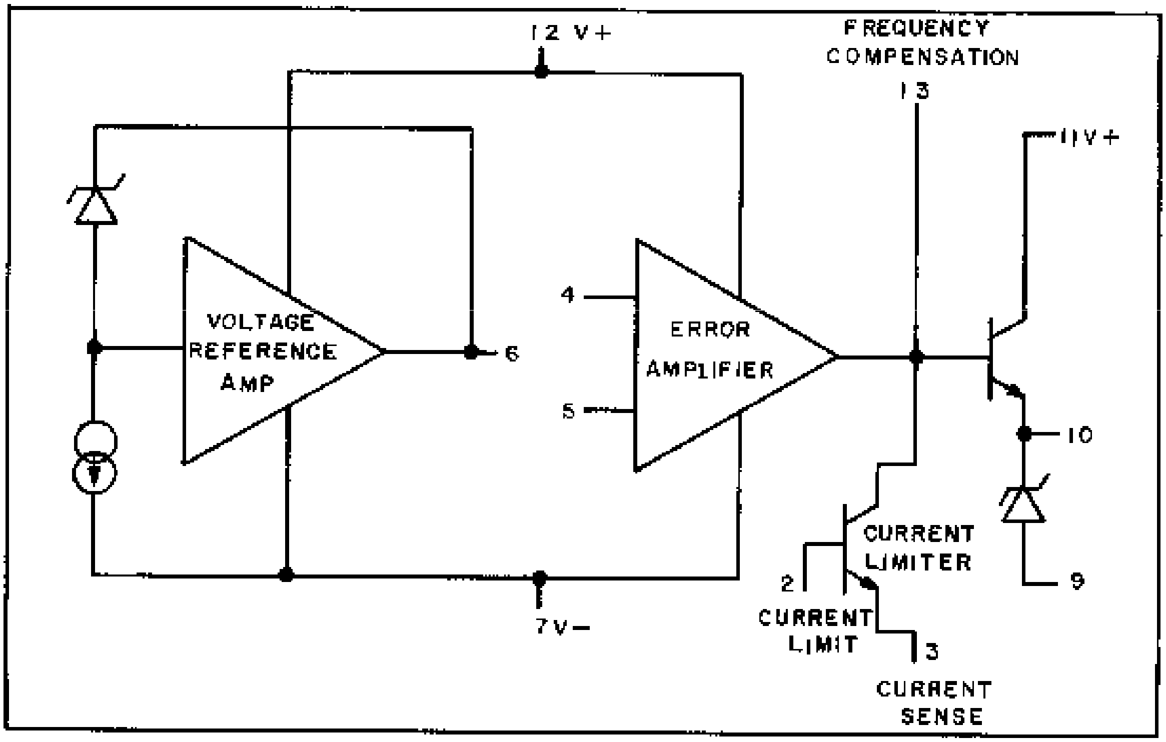
THEORY OF OPERATION

The NE-550 is a precision voltage regulator chip that contains a zener voltage reference, operational amplifier, current limiter, and pass transistor. A portion of the output voltage controlled by R-4 is compared to a reference voltage, any difference or error is amplified by the op-amp and changes the bias on the internal pass transistor to eliminate the error. The reference voltage for the NE-550 is 1.6 volts. Therefore, the output voltage is the ratio of the voltage divider (consisting of R-1, 2, and 3) times 1.6.

The current limiting section of IC1 operates when a voltage of +.6 volts is applied between pins 2 and 3 of IC1. This voltage is developed by the load current through the series-parallel combination of R7, R8 through R11, the .1 ohm resistor and the nominal .6 volt junction drop in the pass transistors. A voltage of opposite polarity is developed across R5 and R6 to ground. Since R5 and R7 are in series between pins 2 and 3, the net voltage is the algebraic sum of the two. When the voltage produced by the load current exceeds the reverse voltage across R5 by .6 volts, the regulator chip turns off, lowering the output voltage. As the output voltage drops, the reverse voltage across R5 decreases, further lowering the output voltage. This creates a fold back current limit effect which reduces the current to a safe level. The value of R6 determines the maximum current which can be drawn from the supply. An open circuit on R5 or R6 will limit the output current to a low level.

The over-voltage protection (OVP) is essentially a crowbar circuit which prevents the output voltage from rising above 14 volts. If the supply voltage (pot on PS3A board) is set too high, the OVP will shut down the supply as soon as it it turned on. To reset the OVP: turn the power off - wait about one minute for the filter capacitor to discharge - turn the regulator pot down - reapply power - adjust the regulator pot for the desired output voltage.



NE550 EQUIVALENT CIRCUIT

The PS-25C is a well filtered regulated 12-14 volt power supply capable of handling up to 25 amps. It is designed for communications equipment where maximum current is drawn less than 50 percent of the time. For continuous operation, it must be derated approximately 20 percent.

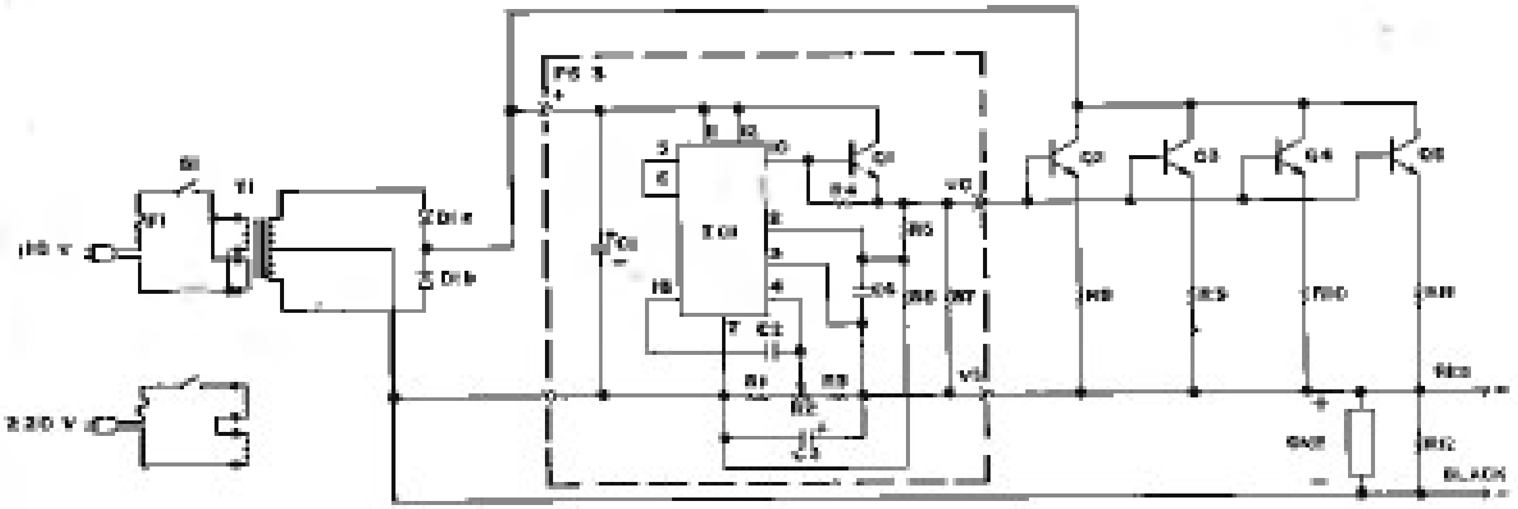
PS-25C SPECIFICATIONS

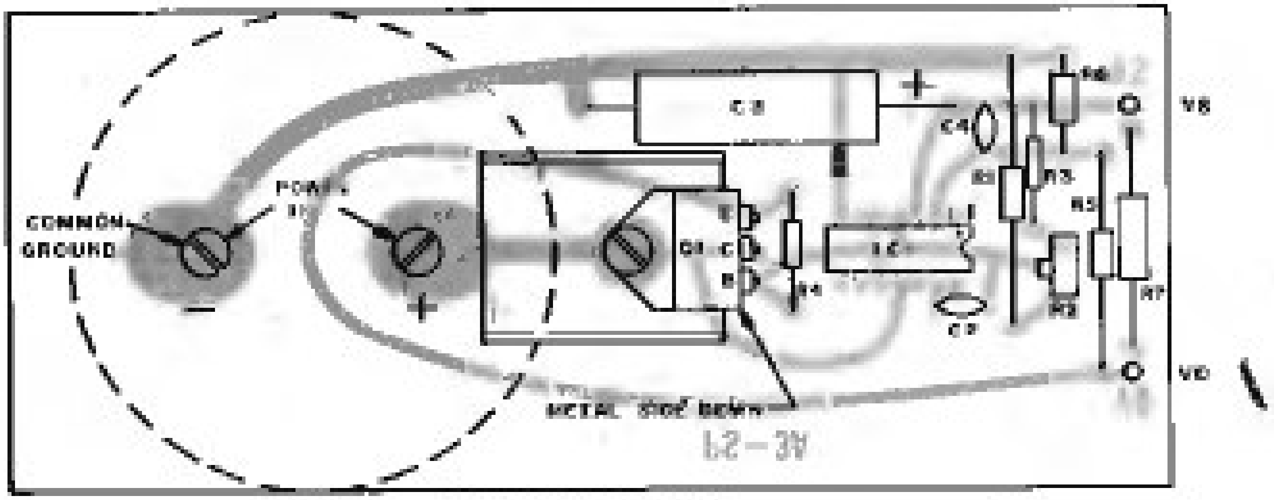
VOLTAGE OUTPUT:	adjustable between 10 and 15 volts.
LOAD REGULATION:	2 percent from no load to 20 amps.
CURRENT OUTPUT:	25 amps intermittent (50 percent duty cycle) 20 amps continuous.
CURRENT LIMITING:	maximum short circuit current 1 amp nominal.
RIPPLE:	50 MV at 20 amps.
AMBIENT TEMP:	65°C Maximum

LIMITED WARRANTY

Factory wired units are warranted for one year. The unit must be returned to the factory postpaid with a note describing difficulty and date of purchase, include a check to cover return postage. Our liability under warranty is limited to repair, adjustment or replacement of units proven to be defective. No further warranty is expressed or implied. Units modified or obviously misused will not be covered by the warranty.

The parts in kits built according to our instructions carry the original manufacturers' warranty. Defective parts must be returned for credit. Units built from kits may be returned to the factory for repair and alignment for a nominal charge, plus parts and shipping.





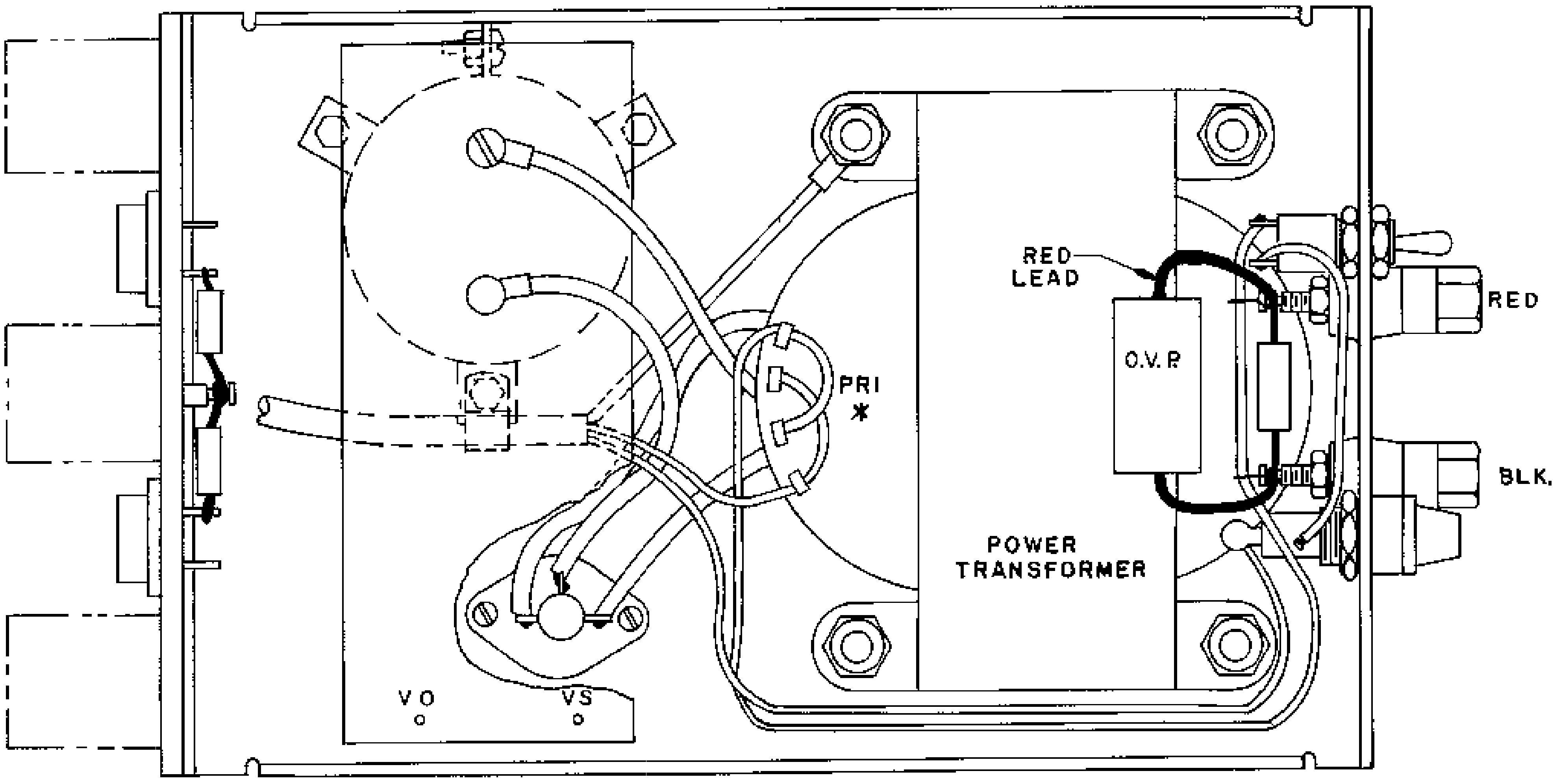
PS 5A COMPONENT VIEW

PARTS LIST

C-1	25000 MFD 40 volt
C-2	.001
C-3	500 MFD 16 volt
C-4	.001
D-1	30 amp PIV Rectifier
ID-1	NE550
Q-1	TIP 3055 or MJE3055
Q-2	2N3055 or equiv.
Q-3	2N3055
Q-4	2N3055
Q-5	2N3055

R-1	1K 5%
R-2	2K Pot
R-3	10K 5%
R-4	5.6K $\frac{1}{2}$W
R-5	330 ohm 5%
R-6	3.3K 5%
R-7	100 ohm 1W
R-8	.1 ohm 5W
R-9	.1 ohm 5W
R-10	.1 ohm 5W
R-11	.1 ohm 5W
R-12	220 ohm 2W
S-1	SPST Switch
T-1	Power Transformer 36V CT @ 25 amps 110/220 volt primary

Hardware, Heat Sinks, Chassis, and Wire



*-TRANSFORMER PRIMARY CONNECTION
SHOWN FOR 110 V.A.C.

PS 25C INSTRUCTIONS

1.) Assemble the PS-3A regulator board as follows (refer to the pictorial of the parts layout). a.) Install the IC first, making sure the notch or dot is near pin 1 as marked on the board. b.) Bend the leads on Q1 towards the metal side at a 90 degree angle. c.) Coat the metal side of Q1 with the white heat sink grease and place it in the center of the "U" shaped heat sink. d.) Mount this assembly to the component side of the circuit board with 6/32 hardware. e.) Mount the remaining components as shown. NOTE: Be sure to substitute the 100 ohm 1 watt resistor in the PS-25C kit for the .1 ohm 5 watt supplied with the PS-3A.

2.) Remove the power transformer from the chassis and set it aside temporarily. Mount the SPST switch, fuse holder, and the red and black output binding posts on the front panel as shown on the "typical parts layout". Mount the four rubber feet on the bottom corners of the chassis.

3.) Mount the condensor bracket in the following sequence:
a.) Orient the case with the front panel to your right.
? b.) Place the bracket inside the case with the open gap toward the front of the chassis. See the layout drawing for the position of the bracket.
c.) Insert an 8-32 X 3/8" machine screw from underneath the chassis through the upper left support tab. Place a star washer on the screw and secure with an 8-32 nut. Fasten the upper right tab in the same manner.
d.) Insert an 8-32 X 1/2" machine screw from underneath the chassis through the lower bracket support tab. Place the nylon cable clamp and a flat washer on the screw and secure finger tight with an 8-32 nut.

4.) Prepare the power cord as follows:
a.) Remove 12" of outer insulation from the end of the cord. SEE #15 ?
b.) Strip 1/8" of insulation from the ends of all three leads.

5.) Install a rubber grommet in the 3/8" hole in the center of the back chassis skirt.

6.) Slip the end of the power cord through the rubber grommet and the nylon cable clamp. The insulation should be flush with the inside edge of the clamp. Tighten the 8-32 nut to secure the power cord and condensor bracket tab.

7.) Cut a 17" length of #12 red wire and strip both ends back 1/2". Tin both ends. Wrap and solder one end of the wire to the red binding post.

8.) Cut a 20" length of #12 black wire and strip both ends back 1/2". Tin both ends. Wrap and solder one end of the wire to the black binding post. Crimp and solder a lug to the other end.

9.) Connect the 220 ohn 2 watt resistor between the red and black binding post. Solder both ends. This is the final connection to the binding posts. ?

10.) Dress the red and black leads as shown on the layout.

11.) Cut a 4" length of #18 ~~black~~ BROWN wire and strip both ends 1/8". Solder one end to the fuse holder side terminal and the other end to the inner terminal of the on-off switch.

Please check all connections made up to this point and touch up any rough, weak, or cold solder joints.

12.) The following operations should be performed BEFORE mounting the power transformer.

a.) Cut a 7" length of #18 ~~black~~ BROWN wire and strip both ends 1/4". Solder one end to the transformer terminal marked "4". Tin the other end which will be connected later.

TRANSFORMER PRIMARY WIRING

For 110V Operation:

Cut and strip two 3" pieces of #18 brown wire. Connect one wire from primary terminal #1 to terminal #3. Connect the other wire from terminal #4 to terminal #2. Solder all four connections.

For 220V Operation:

Cut and strip one 2" piece of #18 brown wire. Connect one end to primary terminal #2 and the other end to terminal #3 of the power transformer. Solder both connections.

b.) Place the power transformer into the case with the primary lugs facing the rear panel. Solder the white power cord wire to the primary terminal marked "1". Solder the black wire of the power cord to the center terminal of the fuse holder.

c.) Cut the secondary center tap lead to $4\frac{1}{2}$" and strip the end $\frac{1}{4}$". Install and solder a #12 solder lug on the lead.

13.) Mount the power transformer using four 1/4 X 20 bolts, nuts and lock washers.

? 14.) Solder the green (ground) power cord lead to the ground lug on the power transformer. This is the lug with a green lead already connected to it.

? 15.) Solder the free end of the #18 black wire which was installed in step 14b to the remaining terminal of the on-off switch. ?

16.) a.) Cut a $7\frac{1}{2}$" length of #12 red wire and strip both ends $\frac{1}{4}$". Crimp and solder a lug to one end. Solder the other end to the + terminal of the rectifier.

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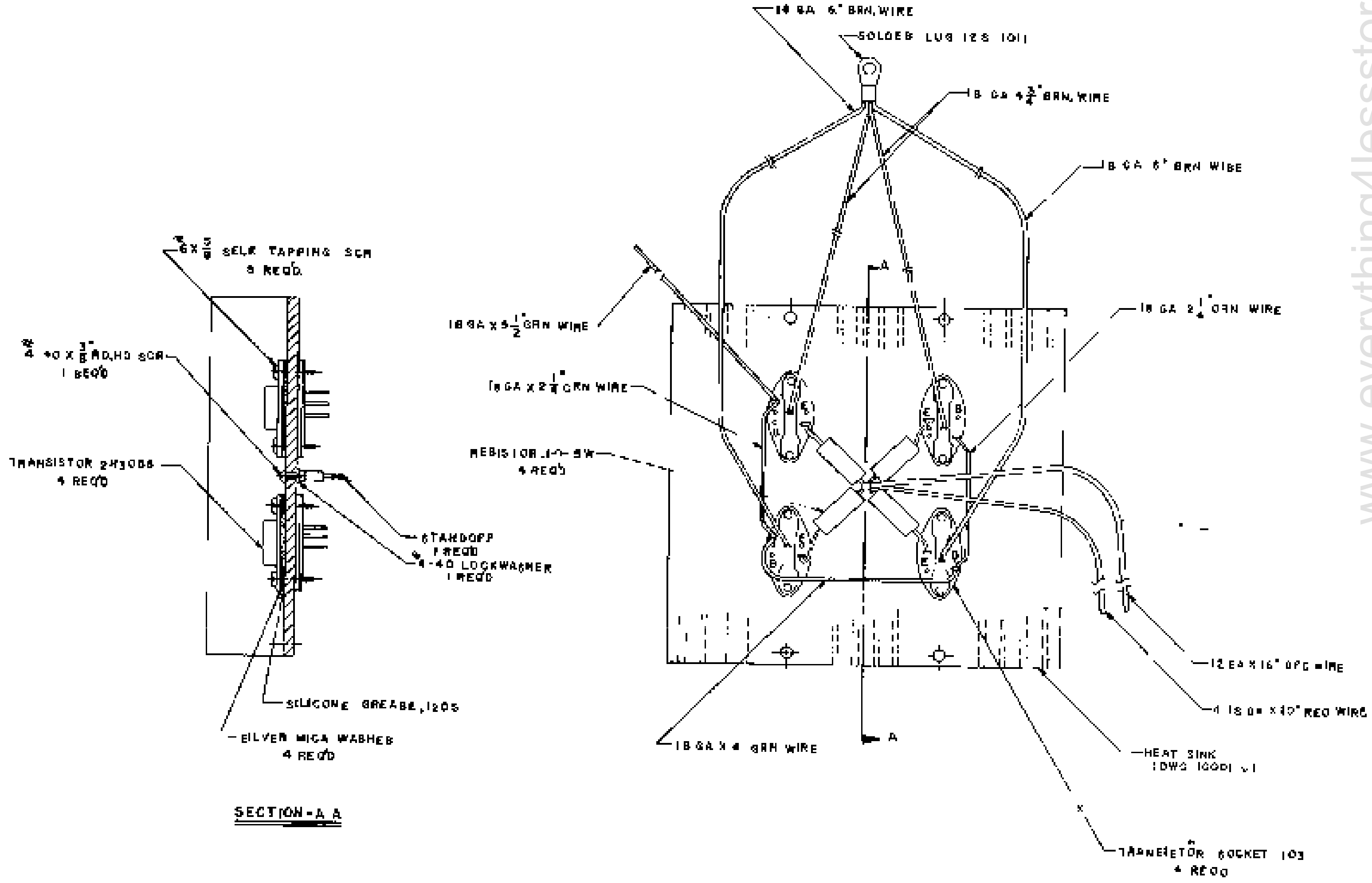
(b.) Cut 2" from the ends of both transformer secondary leads and strip ¼" of insulation from each lead. Solder one of the transformer secondary leads to either of the remaining rectifier lugs. Solder the other secondary lead to the opposite rectifier lug. Be sure to use adequate solder and that a firm clean joint is made.

(17.) Coat the bottom of the rectifier with white heat sink grease. Mount the rectifier on the main chassis using 6-32 X 3/4 hardware. The rectifier may be oriented to provide the best lead dress.

SET THE MAIN CHASSIS ASIDE TEMPORARILY



SECTION-A A

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18. Mount the 4 pass transistors on the heat sink as follows: Coat both sides of a mica insulator with heat sink grease. Slip the coated insulator over the pins of the transistor. Carefully plug the transistor through the heat sink into a socket held on the inside. Be sure to orient the transistor so that the pins are centered in the holes of the heat sink and the positioning holes of the socket line up properly. Secure the entire assembly using #6 X 5/8" self-taping screws.

IF THE PINS OF THE TRANSISTORS ARE INADVERTANTLY SHORTED TO THE HEAT SINK, MAJOR DAMAGE TO THE SUPPLY CAN RESULT

19. Mount the standoff insulator in the center hole of the heat sink using a #4 screw with a lock washer under the screw head.

20. Connect four .1 ohm 5 watt resistors from the emitter connections of each of the pass transistors to the center stand off insulator. The emitter is the transistor socket solder lug closest to the center stand off. Pass each lead through the hole in the socket lug and crimp securely before soldering. When wrapping the resistor leads on the center insulator be careful not to exert excess pressure since it is possible to fracture the insulator.

21. Position the heat sink on the bench with the mounting holes toward you and the transistor sockets facing up. The following steps will assume that this positioning is maintained.

22. Cut four $3\frac{1}{2}$" pieces of #18 green wire. Strip each end back $\frac{1}{4}$". Starting with the upper right transistor and proceeding clockwise, connect each of the transistor bases together. (The base is the outer solder lug on each socket) The fourth piece of green wire should be connected to the upper left transistor base lug. The remaining end will be connected later.

23. Prepare a cable assembly as follows:
    a. Cut two 4" pieces of #18 brown wire. Strip both ends 1/4".
    b. Cut two 5" pieces of #18 brown wire. Strip both ends 1/4".
    c. Crimp and solder one end of each of the 4 wires into one solder lug.
    d. Pre-tin each of the 4 remaining free ends.

24. Solder one of the 5" leads to the center (collector) lug of the lower right transistor socket. Solder the other of the 5" leads to the center lug of the lower left socket.

25. Solder one of the 4" leads to the center lug of the upper right socket. Solder the remaining lead to the center lug of the upper left socket. Temporarily set the heat sink aside.

26. Slip the filter capacitor into the clamp. Orient the positive terminal toward the rectifier. Install a #6 X $\frac{1}{2}$ machine screw, lock washer and nut in the clamp and tighten securely.

27.) Mount the heat sink to the main chassis using 8-32 X $\frac{1}{2}$" screws, lock washers and nuts.

28.) Cut a 6" piece of #18 red wire and strip both ends 1/4". Wrap and solder the #18 red wire and the #12 red wire from the red output binding post to the center stand off insulator on the heat sink.

29.) Mount the PS-3A card on the capacitor terminals using #10-32 hardware in the following sequence: Screw - lockwasher - terminal lugs - flat washer - P.C. board - capacitor. The lug on the #12 black wire from the black output post and the lug on the transformer center tap lead should be placed under the minus terminal screw. The lug on the #12 red lead from the rectifier and the lug on the 4 brown leads from the transistor collectors should be placed under the positive terminal screw. Tighten both screws securely. Any resistance at these points will have an adverse effect on the regulation.

30.) Solder the green wire from the transistor bases to the "VO" terminal on the PS-3A.

31.) Solder the #18 red lead from the center stand-off insulator on the heat sink to the "VS" terminal on the PS-3A.

32.) Install the overvoltage device. Solder the black lead to the black output binding post lug. Solder the red lead to the red binding post lug.

This completes the wiring of the PS-25C power supply.

BEFORE APPLYING POWER, CAREFULLY CHECK ALL SOLDER CONNECTIONS

PS25C FINAL TEST AND ASSEMBLY

1.) Install the fuse in the fuse holder (10 amp for 110V, 5 amp for 220V).

2.) Set the voltage adjust control (R-2) in the regulator card to mid position.

3.) Connect a volt meter to the output terminals. Set the meter to read 20-50 volts full scale

4.) Plug in supply and turn switch on. Adjust R-2 for a nominal 13.8 volts output.

5.) If the control is adjusted above 15 volts, the O.V.P. will shut down the supply. The O.V.P. is reset by turning off the supply for approximately one minute (be sure to reset control to mid position).

6.) Slide the six Tinnerman fasteners over the mounting holes on the main chassis flanges.

7.) Place the cover on the chassis with the beveled end toward the front. Line up the mounting holes with the Tinnerman fasteners and secure the cover using six #6 X 3/8 self taping screws.

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TROUBLE SHOOTING

NO OUTPUT

1.) Check fuse or circuit breaker.

2.) The overvoltage protection device may be shutting down the supply as soon as it is turned on. To reset the OVP: Turn the power off - wait about one minute for the filter capacitor to discharge - turn the regulator pot down - reapply power - adjust the regulator pot for the desired output voltage.

3.) Measure voltage across filter capacitor.
  a.) If 22-25 VDC is present, proceed to step 7.
  b.) If no voltage is present, proceed to step 4.

4.) Check the bridge rectifier for shorts or open.

5.) Check the power cord continuity.

6.) Check the transformer primary and secondary for continuity.

7.) Measure the voltage at the base of the pass transistor on the PS3 card. This measurement can be made at the "VO" terminal.
  a.) If no voltage is present, proceed to step 10.
  b.) If 12-24 volts is present, proceed to step 8.

8.) Check the pass transistor on the PS3 card for open junctions.

9.) Check the .1 ohm resistors for open circuit.

10.) Measure the voltage at the base of Q1.
  a.) If the reading is 12-24 volts, Q1 may be defective, (see test chart below) Check carefully for cold solder joints.
  b.) If the reading is 0 volts, proceed to step 11.

11.) Check the voltage at IC1 pin 4.
  a.) If the reading is over 1.6 volts, check R1, R2, and R3 for open.
  b.) If the reading is below 1.6 volts, check the voltage on IC1 pins 11 and 12. If it is between 22-24 volts, IC1 may be bad. If it is 0 volts, check for open land or cold solder joints on circuit board.

VOLTAGE DROP UNDER LOAD

1.) Reduce the load and recheck the output voltage. The current limit will reduce the output voltage if a load greater than the supply can handle is applied.

2.) Check the voltage across the filter capacitor (C1) under load.
    a.) If the reading is under 20 volts, proceed to step 4.
    b.) If the reading is 20-24 volts, proceed to step 3.

3.) Check the solder connections to the front panel output terminals. Be sure that the screws which hold the PS3 in place are tight.

4.) Check diode D1 for an open junction.

5.) Check the solder connections between the transformer and rectifier.

6.) Be sure that the screws which hold the PS3 in place are tight.

7.) Check Q1 for an open junction (see chart below). If Q1 checks good, IC1 may be bad.

EXCESSIVE HUM

1.) Be sure that the screws which hold the PS3 in place are tight.

2.) Check the bridge rectifier for open diodes.

3.) Check line voltage. Excessively low line voltage may cause hum under heavy loads. Lowering the output voltage of the supply may correct this problem.

PS25C ERRATA

(1) Step 11 - #18 black should be #18 brown ✓

(2) Step 12A - #18 black should be #18 brown ✓

PS25C FINAL TEST AND ASSEMBLY

(1) Install the fuse in the fuse holder (10 amp for 110V, 5 amp for 220V).

(2) Set the voltage adjust control (R-2) in the regulator card to mid position.

(3) Connect a volt meter to the output terminals. Set the meter to read 20-50 volts full scale.

(4) Plug in supply and turn switch on. Adjust R-2 for a nominal 13.8 volts output.

(5) If the control is adjusted above 15 volts, the O.V.P. will shut down the supply. The O.V.P. is reset by turning off the supply for approximately one minute (be sure to reset control to mid position).

(6) Slide the six Tinnerman fasteners over the mounting holes on the main chassis flanges.

(7) Place the cover on the chassis with the beveled end toward the front. Line up the mounting holes with the Tinnerman fasteners and secure the cover using six #6 X 3/8 self taping screws.

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